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14. ABSTRACT

For this award, SIO deployed the MPL lidar, whole sky camera, and precipitation lidar during the 2010 Cape Weather Measurements Field Project. SIO investigated transiton between the liquid and ice phase in the upper level clouds by combining lidar and radar datasets. SIO analyzed the high resolution data sets to discern the overall structure of the cloud circulations and reflectivity field.

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Cloud microphysics, radiation studies, cloud circulation

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Final report: High resolution cloud microphysics and radiation studies
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Results

We have deployed the MPL lidar, whole sky camera, and precipitation lidar during the 2010 Cape Weather Measurements Field Project to characterize fine scale microphysics characteristics of mid level altocumulus clouds and upper level visible and subvisual cirrus clouds. The MPL lidar provided information about the temporal evolution of clouds, cloud base, and cloud top, volume extinction coefficient, and the backscatter/extinction lidar ratio. We investigated

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transition between the liquid and ice phase in the upper level clouds by combining lidar and radar datasets. We participated in the co-located balloon, lidar, and radar study of cirrus and altocumulus clouds to further investigate the presence of multi-cloud and nearly cloud-free layers within any given stratiform cloud system and to characterize their thickness. We analyzed the high-resolution data sets to discern the overall structure of the cloud circulations and reflectivity field. The MPL lidar was used for continuous monitoring of clouds and aerosol profiles in stand-alone mode. The system was networked through TCP/IP to local computer and operated with pre-installed software with real time data display in an eye-safe mode. The whole sky camera operated in visible light and panoramic pictures of several cloud cases were collected. The MPL lidar was enhanced before the field experiment with co- and cross-polarization channels to provide information about the temporal evolution of clouds, cloud base, and cloud top, volume extinction coefficient, and the backscatter/extinction lidar ratio. One of the achieved goals was to provide a coherent high-resolution data set of the clouds and thermodynamic structure to build a mesoscale and LES test-bed for cirrus and altocumulus cloud layers. The project was completed through a collaborative effort with NRL Monterey. A Ph. D. student Dariusz Baranowski participated in the field project. We released all the data after the experiment including analyzed lidar data. We analyzed the 2009 Cape Weather Measurement Field Campaign. In Spring 2010, we prepared the instrumentation including upgrades to environmental enclosure and updates to lidar. In Summer 2010, we participated in the 2010 Cape Weather Measurement Field Campaign. In the Fall 2010, we performed post analysis of the 2010 Cape Weather Measurement Field Campaign.